

Operating instructions

Machine designation: Vacuum mixer

Machine type: D-VM 16

Machine no.:

Keep for future reference!

Dear customer,

Thank you for the confidence you have placed in us by purchasing this vacuum mixer.

For this device to be of service to you for many years to come, please take the time to read these operating instructions carefully, especially before using the device for the first time.

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1 Safety

1.1 Intended use

The D-VM 16 vacuum mixer is intended for use in dental laboratories for mixing plaster and embedding materials under vacuum conditions.

Unauthorized modifications and additions are not permitted for safety reasons!

1.2 Possible dangers

- The vacuum mixer is safe when used as intended. However, when not used properly or with due care its use can lead to injuries. In no case at all should the stirrer be used without mixing container. Unguarded stirrer can lead otherwise to injuries.
- Before maintenance work, cleaning and/or repair work you should switch the unit off at the main switch and disconnect it from the mains supply (i. e. the mains plug should be pulled).
- Before accessing any of the incorporated electric components, the unit should be disconnected from the mains supply!

1.3 Approved operators

The operator of the machine should make sure that the operating instructions are accessible to the operating personnel. The operator should make sure that they have been read and fully understood by the operating personnel. Only then should they be allowed to operate the machine.

1.4 Safety measures at the site of operation

Table unit:

The installation surface should be flat and stable according to the weight of the vacuum mixer.

Wall unit:

The wall unit is hung into a wall mounting plate (19), in which a lifting table (12) for the mixing receptacle (11) is incorporated. To fasten this plate to an accordingly stable and firm wall you require appropriate tools and materials (dowels, screws, etc.). After hanging the unit into the mounting plate you should tighten the safety screw (23).

The unit should be installed in a dust-free environment. For aeration and ventilation to function properly it is required that between the sides of the unit and surrounding objects there be a distance of approx. 5 cm. Foreign bodies should not be inserted through the aeration inlets of the unit.

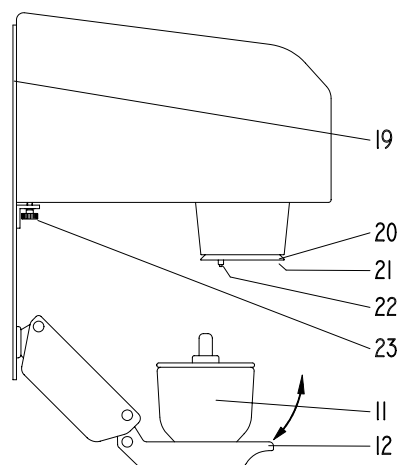


Fig. 1: Wall unit

1.5 Marking of safety references contained in these instructions

Note	Refers to tips and other particularly helpful pieces of information.
Caution	Refers to particular ways of operation or handling, the non-adherence of which can lead to malfunctioning, damages or other kinds of trouble.
Danger	Refers to dangerous situations, in which injuries can occur.

2 Unpacking the vacuum mixer

1. Place the carton onto a flat surface.
2. Remove the upper packaging material.
3. Press the packaging material away from the device and grasp the lower edge of the device.
4. The device (weight = approx. 28 kg) should be lifted by two people out of the carton.
5. Check the accessories:
 - Documentation
 - Mixer receptacle (300 ml) complete with lid and stirrersno. 016 00 251
 - For further accessories (if applicable), see note of delivery.

3 Setting into operation

3.1 Brief description of the device and identification of the components

The vacuum mixer is equipped with an automatic programmed control. It mixes embedding materials and plasters under optimum vacuum conditions. The extremely powerful and sturdy geared mixer motor as well as the maintenance-free high-performance double-piston vacuum pump, which quickly generates a vacuum of 970 mbar comprise the sound and reliable central components of this device. The lifting table serves both as a holding as well as a guiding facility for the mixer receptacle. When being lifted the stirrer coupling components are inserted into each other and joined together. At the same time the mixer receptacle is pressed against the sealing surfaces and kept in position even without vacuum. The processing cycles can be carried out automatically and manually. Upon request, the D-VM 16 can be equipped with an incorporated agitator.

The heavy aluminum cast device base provides table units with optimum stability. Wall units are held fast by a sturdy wall mounting plate.

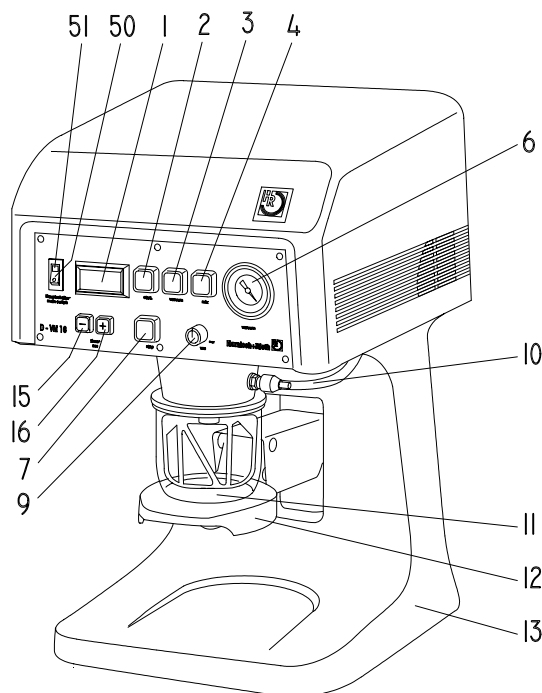


Fig. 2: Front right view

1	Time display for timer
2	Start switch
3	Vacuum switch
4	Mix switch
5	Agitator switch
6	Manometer (vacuum display)
7	Stop switch
9	Vacuum regulator
10	Suction hose
11	Mixer receptacle
12	Lifting table
13	Device base (table device)
15	Timer key "-"
16	Timer key "+"
50	Main switch
51	Control lamp for main switch

3.2 Initial operation procedure

(See fig. 2 on page 3)

Caution	On the rear side of the device there is a red transport protection plate, which should be removed before initial operation! (Please keep for possible transportation at a later date.)
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1. Remove the transport protection plate by unscrewing the three M6 Allen screws (5 mm). Keep plate and screws in a safe place.
2. Connect the device to the mains supply (230 volts/50 Hz).
3. Actuate the main switch (50). Control lamp (51) lights up green.

Note	When the device is switched on the display (1) shows the priority time. It is set ex works to 10 sec. For further details, <u>see section "4.6"</u> .
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4. Automatic mixing in vacuum for pre-selected interval, see section "4.1".
5. Mixing without vacuum for pre-selected interval, see section "4.2".
6. Creating vacuum only (e. g. for watering models), see section "4.3".
7. Creating vacuum without pre-selected time, see section "4.3.1".
8. Creating vacuum with pre-selected time, see section "4.3.2".
9. Different type of manual processing procedures, see section "4.4".
10. Agitator equipment (optional), see section "4.5".
11. Instructions for setting and/or saving the mixing time, see section "4.6"

4 Operating instructions

4.1 Automatic mixing in vacuum for a pre-selected interval

(See fig.1 on page 2 and fig. 5 on page 7)

1. For setting the desired mixing time (pre-selected interval) use the keys "+" and "-" (except for when working with priority times). For further details see section "4.6".
2. Premixing the embedding materials or plasters for processing in the mixer receptacle by hand and thereby remaining below the max. mixture marking. The powder should be moistened with enough water to prevent it from being whirled into the air by the stirrers.
3. Press „start“ switch (2).

The device is now programmed. The device starts automatically only when the mixing receptacle (11) is conveyed upwards with the lifting table and pressed against the sealing surface (21), where it actuates the contact pin (22) available there.

– **Running the automatic program:**

1. Display (1) counts backwards once per second. The vacuum pump is active with a vacuum being quickly generated. The mixing receptacle is now additionally being held fast by the vacuum.
 2. As soon as approx. 700 mbar vacuum is generated in the mixing receptacle, the stirrer is activated and the timer started.
 3. With the vacuum regulator (9) you can now set the desired vacuum between 400 and 970 mbar while observing the manometer (6).
 4. As soon as "000" is shown in the display (1) the stirrer is deactivated and the device emits a "beeping" sound for 3 sec..
 5. The vacuum pump maintains the vacuum. The vacuum pump can only be deactivated by actuating the „stop“ switch (7), which also initializes a well-dosed flooding of the mixing receptacles.
 6. The pre-selected interval is shown on the display (1).
4. Only when the pressure at the manometer has returned to "0" bar should you lower the lifting table (12) with the mixing receptacle (11) by hand until reaching the limit stop.
 5. Remove the stirrer. The mixture is now ready for being used.

4.2 Mixing without vacuum for a pre-selected interval

(See fig. 1 on page 2 and fig. 3 and 4 on page 5 and fig. 5 on page 7)

1. Premixing of the embedding material or the plasters to be processed in the mixing receptacle by hand and thereby remaining below the "max." mixture marking. The powder should be moistened with enough water to prevent it from being whirled into the air by the stirrer.
2. Press the „mix“ switch (4), the display (1) shows the „H“ on the left side (see fig. 3) and on the right side the mixing time (factory-preset to 20 sec.). For setting the mixing time see section "4.6".
3. Place the mixing receptacle (11) with attached stirrers onto the lifting table. Move the lifting table upwards by hand and **keep pressed against the sealing surface**. The stirrer is now coupled. The stirrer is activated and the timer is started.
4. While the timer is activated, you can at any time and as often as you wish switch off and on the stirrer by pressing the „mix“ switch (4).
When stirring is interrupted the display shows the letter „P“ on the left side, see fig. 4. During that time the timer will continue running according to the previously stored mixing time.
5. As soon as "000" is shown in the display (1) the stirrer is deactivated and the device emits a "beeping" sound for 3 sec..
6. Lower the lifting table (12) and remove the stirrer. The mixture is now ready to be used.

Note

- As soon as "000" is shown in the display (1) the contact pin (22) is deactivated.
- by pressing the „stop“ switch (7) the contact pin (22) is activated.

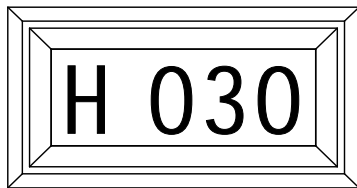


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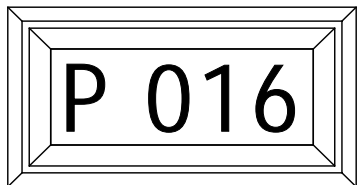


Abb. 4

4.3 Creating vacuum only, (e. g. for watering models)

For watering models use receptacle with special lid without stirrer!

- Special lid for 300 ml receptacle part no.: 32034
- Special lid for 600 ml receptacle part no.: 32035
- Special lid for 1000 ml receptacle part no.: 32039

4.3.1 Creating vacuum without pre-selected time

(See fig. 1 on page 2 and fig. 5 on page 7)

1. Press „vacuum“ switch (3).
2. The vacuum pump starts automatically only when the mixing receptacle (11) is conveyed upwards with the lifting table and pressed against the sealing surface (21), where it actuates the contact pin (22).
3. In the standard mode the vacuum is generated without time limit.
 - On the display (1) the timer shows "000". This means that the vacuum pump is running in continuous mode (manual operation mode).
 - Press „stop“ switch (7) to deactivate vacuum pump.
4. As soon as the manometer (6) shows "0" bar you can lower the lifting table (12) with the mixing receptacle (11) by hand until reaching the stop limit.

4.3.2 Creating vacuum with pre-selected time

(See fig. 1 on page 2 and fig. 5 on page 7)

1. Press „vacuum“ switch (3).
2. Use switches „+“ and „-“ to set the vacuum time if required, see section „4.6.5“.

Note	Briefly pressing the „+“ or „-“ keys changes the displayed value in steps of 1. Keeping the key pressed increases the speed with which the display is changed.
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3. The max. time period which can be set is 999 sec..
4. The vacuum pump starts automatically only when the mixing receptacle (11) is conveyed upwards and pressed against the sealing surface (21), where it actuates the contact pin (22) .
5. The timer starts automatically after a short delay interval with the display (1) counting backwards once every second.
6. As soon as „000“ is shown in the timer display the device emits a „beeping“ sound for 3 sec.. The vacuum pump remains activated (the LED in the vacuum switch (3) remains illuminated).
7. Press „stop“ switch (7) to deactivate vacuum pump.
8. As soon as the manometer (6) shows “0” bar you can lower the lifting table (12) with the mixing receptacle (11) by hand until reaching the stop limit.

4.4 Different type of manual processing procedures

(See fig. 5 on page 7)

The processing cycles „vacuum“ and „mixing“ can be selected in arbitrary sequence.

- Via the switches „vacuum“ (3) and „mixing“ (4) the corresponding functions in all four combinations can be additionally switched on and off. In doing so the „start“ switch's (2) function is disabled.
- Pressing a key or switch activates its LED illumination, subsequent releasing it activates its function.
- In the automatic operation mode switches (3) and (4) are disabled after activating the „start“ switch (2). Activating the „stop“ switch (7) cancels all active functions.

4.5 Agitator equipment (optional)

(See fig. 7 on page 10)

- The agitator plate (36) can be switched on/off independent of all other functions activated by the agitator switch (5).

4.6 Instructions for setting and/or saving the mixing time

(Fig. 5 on page 7)

1. The device is programmed at works in such a way that after being set into operation (actuating the main switch (50)) the number 10 is shown on the display (1), i. e. the mixing time lasts for 10 sec during program execution. This stored mixing time is referred to as the priority time.
2. If you want to use another mixing time than the priority time then enter the desired values by appropriately pressing the switches „+“ and „-“. This modified mixing time is referred to as the pre-selected interval. The pre-selected interval value remains valid for all mixing procedures until it is changed or until the device is deactivated by main switch (50). Switching on the device again causes the stored priority time to be displayed, i. e. for program execution the mixing time is set to 10 sec. (ex works).

3. **Changing and saving the priority time:**
 - Before changing the priority time de-actuate the main switch (50) for approx. 3 sec and then actuate it again.
 - The display (1) shows the saved priority time (set ex works to 10 sec.).
 - Enter the new priority time by pressing the “+” and “-“ keys.
 - The arrows (17) are displayed.
 - Now immediately (while the arrows (17) are visible) press both keys “+” and “-“ together and keep them pressed.
 - The new priority time disappears and the bars (52) appear. The bars (52) are then erased and the new priority time reappears. The new priority time is now saved.
 - Now release the “+” and “-“ keys.
 4. You can always use a pre-selected interval which deviates from the priority time. See above point 2 for further details.
 5. During a processing cycle (“mixing“, see section “4.1“ and “4.2“ or “generating a vacuum only“, see point “4.3.2“) you can change the remaining processing time, i. e. the time still left for the ongoing processing cycle, by pressing the keys “+“ or “-“. Pressing the keys “+“ or “-“ stops the remaining time on the display (1). The internal electronic clock continues in the background. The time you need to change the remaining processing time is automatically deducted from the new remaining processing time and is jumped on the display (1). The modified remaining processing time is only valid for the ongoing processing cycle, i. e. it is not stored.
 6. Setting the mixing time for manual processing:
 - Keep the „mix“ switch (4) pressed (the display (1) wil show on the left side the letter „H“. The right side of the display (1) will show the mixing time (factory-preset to 20 sec.).
 - Enter the new mixing time via switches „+“ and „-“.
- Note** Briefly pressing the “+“ or “-“ keys changes the displayed value in steps of 1. Keeping the key pressed increases the speed with which the display is changed.
- The arrows (17) will appear.
 - Now immediately press both keys „+“ and „-“ together and keep them pressed until the bars (52) disappear. The new mixing time is now stored.
 - Release „mix“ switch (4).
- Note** The stored mixing time remains saved even when the device is switched off, or in the case of power failure.
7. The max. time period which can be set is 999 sec..

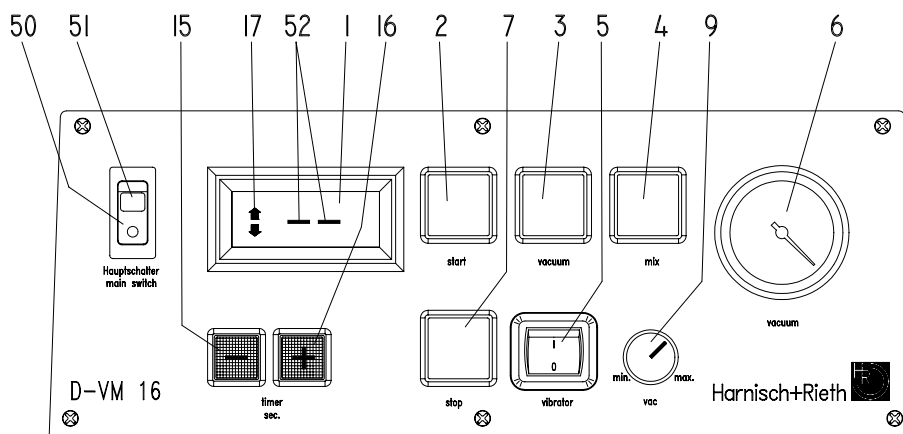


Fig. 5: Operating elements

1	Time display for timer	9	Vacuum regulator
2	Start switch	15	Timer “-“ key
3	Vacuum switch	16	Timer “+“ key
4	Mix switch	17	Arrows for setting time
5	Agitator switch (optional)	50	Main switch
6	Manometer (vacuum display)	51	Control lamp for main switch
7	Stop switch	52	2x bars

5 Cleaning/maintenance

5.1 Filter test

(See fig. 7 on page 10)

1. This test program is intended for checking the degree of filter pollution.
2. Place the mixing receptacle (**600 ml**) with stirrer attached onto the lifting table and convey upwards by hand. This presses the lid of the mixing receptacle against the sealing surface (21) and actuates the contact pin (22).
3. The vacuum regulator (9) must be turned clockwise to max. position.
4. The filter test is started as follows:
 - Press and keep pressed „stop“ button (7),
 - then additionally briefly press the timer key „+“
 - and then let go of the „stop“ button (7).
5. The switches (2), (3) and (4) light up during the filter test and a minus character appears on the display (1) in front of the timer value.
6. The timer starts with „010“ on the display (1) and then counts backwards once per second. If a vacuum of 0.7 mbar is generated before the set timer value has elapsed, then the remaining processing time can be read from the display. The higher the time value of the remaining processing time, the lesser the pollution in the incorporated filters.
7. „Err“ appearing on the display means that the filters or the hoses are polluted. For further details see section „5.2“.
8. This message remains on the display until the „stop“ button (7) is actuated.

5.2 Changing the filters

(See fig. 7 on page 10)

- As according to experience dust or even small portions of the mixture can be sucked in by the device during the mixing process, a preliminary filter (30), which can be easily accessed, is built into the device. Furthermore, a subsequent ultra-fine filter (27) is included in the device. When polluted both need to be changed.
1. The **ultra fine filter** (27) is contained in the ultra fine filter fixture (28). Turning it anti-clockwise opens the bayonet locking thus allowing the ultra fine filter fixture together with the ultra fine filter to be detached. Insert a new ultra fine filter cartridge into the device. Insert the ultra fine filter fixture into the device and lock by turning it clockwise.
 2. The **preliminary filter** (30) is built into the suction hose (10). If it is clogged, then the entire suction hose component group has to be exchanged. (Suction hose component group from Harnisch + Rieth, part no.: 016 00 513):
 3. Remove old suction hose:
 - Press unlocking ring (26) with screw driver (25) or some similar tool to unlock and pull quick-adjustment angle (29) downwards out off the mating part (37).
 - Loosen swivel nut (34) and detach second end.
 4. Insert new suction hose component group:
 - Slide quick-adjustment angle (29) as far as possible into the mating part (37).
 - Slide hose end with support sleeve (35) into the screw nipple (38) and tighten the swivel nut (34).

5.3 Contact pin polluted

(See fig. 6 on page 9)

- If because of defects of the protective silicone cap (53) the contact pin (22) is polluted and jammed then you have to clear the guide (24) with an appropriate slotted screwdriver (right-handed thread).

Caution	When loosening and tightening with the screwdriver make sure that the inner side of the guide (24) and the slot are not damaged (deburring) to prevent the contact pin (22) from being jammed.
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- Clean the contact pin (22) and guide (24) and make them easy to move. Reassemble when dry. Replace the protective silicone cap (53).

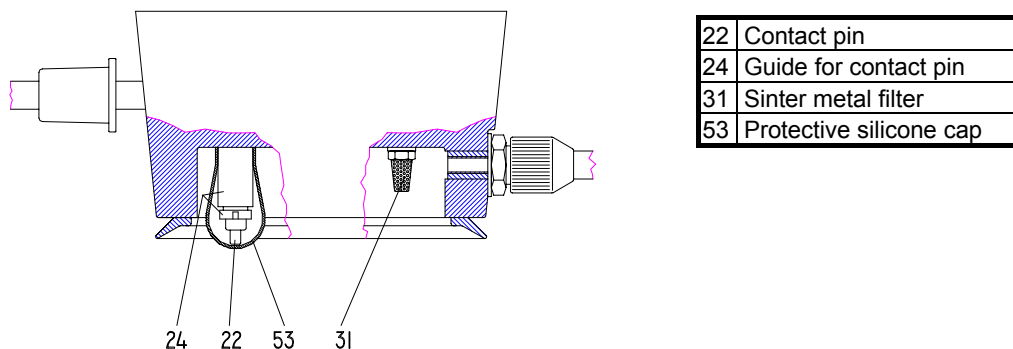


Fig. 6: Contact pin with protective silicone cap and sinter metal filter

5.4 Sinter metal filter for vacuum control

(See fig. 6 on page 9 and fig. 7 on page 10)

- If the manometer (6) responds with a long delay or if it fails completely then you should first change the sinter metal filter (31).
- Wrench size 7 mm.

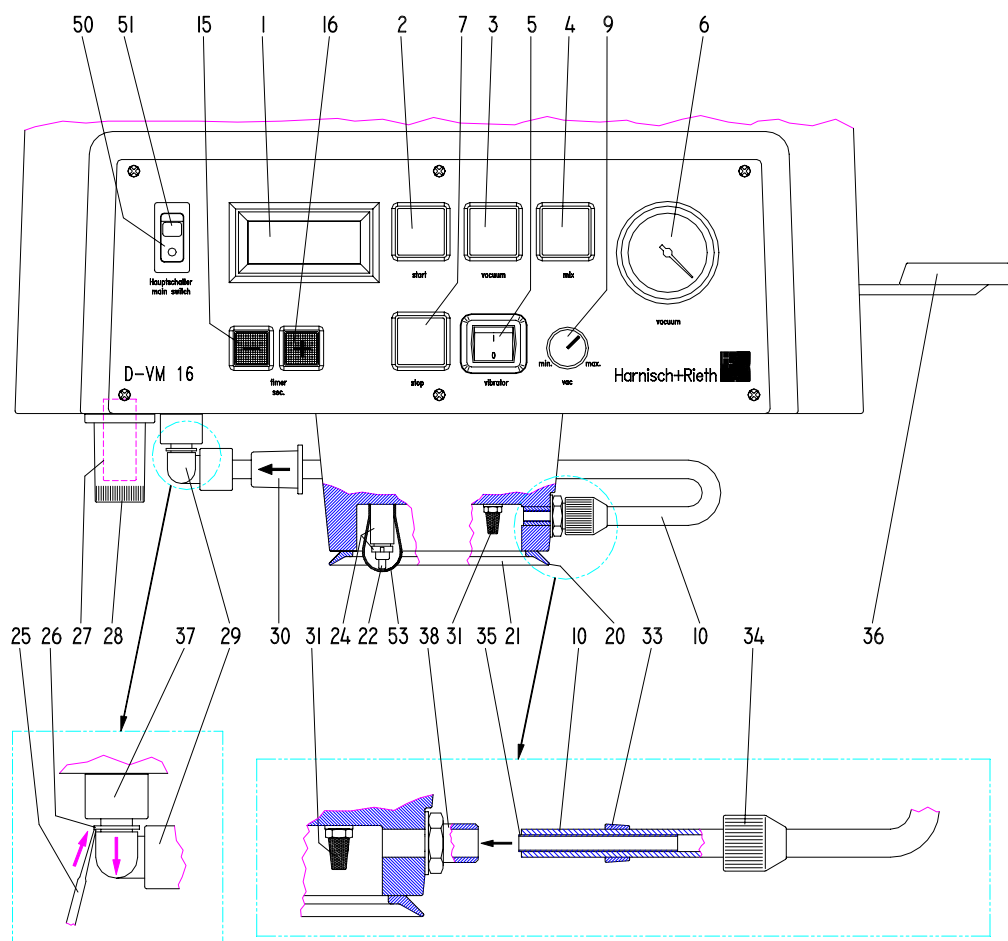


Fig. 7: replacing ultra fine filter and suction hose

1	Time display for timer	26	Unlocking ring
2	Start switch	27	Ultra fine filter
3	Vacuum switch	28	Ultra fine filter fixture
4	Mix switch	29	Quick-adjustment angle
5	Agitator switch	30	Preliminary filter
6	Manometer (vacuum display)	31	Sinter metal filter
7	Stop switch	33	Clamp ring
9	Vacuum regulator	34	Swivel nut
10	Suction hose	35	Support sleeve
15	Timer key “-“	36	Agitator plate
16	Timer key “+“	37	Mating part
20	Sealing lip	38	Screw nipple
21	Sealing surface	50	Main switch
22	Contact pin	51	Control lamp for main switch
24	Guide for contact pin	53	Protective silicone cap
25	Screw driver		

6 Electrical fuse protection

(See fig. 8 on page 11)

- The mains connection (32) is fuse protected with the two main fuses (42) 5 A/T.
- The control unit (printed board) is fuse protected with a fuse for feeble currents (0.315 A/T). It is located on the printed board inside the device behind the paneling.

Electrical components can be accessed by removing the device cover (45).

Danger

Before taking off the cover switch off the device and pull the mains plug.

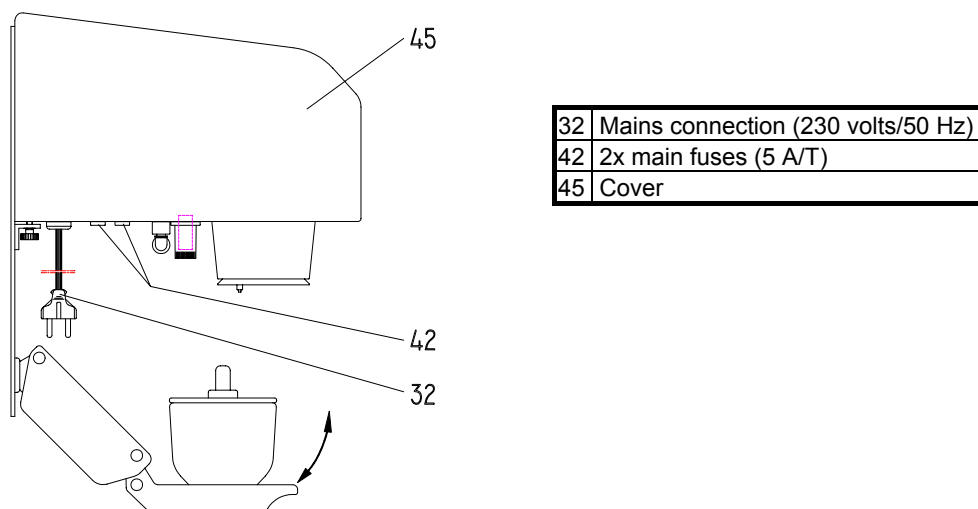


Fig. 8: electrical fuse protection

7 Technical data

Machine designation	: Vacuum mixer
Machine type	: D-VM 16
Device dimensions	: Width 380 mm, (without agitator equipment) Width 440 mm, (with agitator equipment) Depth 355 mm, Height 520 mm (wall device) Height 540 mm (table device)
Electrical connection	: 230 volts/50 Hz
Overvoltage category	: II
Power consumption	: max. 420 watts max. 490 watts (with agitator equipment)
Stirrer speed	: 300 rpm
Vacuum	: max. 970 mbar (vacuum)
Electrical fuse protection	: 2x 5 A/T (main fuse)
Weight	: approx. 32 kg. (table device) approx. 27 kg (wall device)
Mixing receptacle sizes	: 60 ml, 150 ml, 300 ml, 600 ml and 1000 ml. (insert 1000 ml mixing receptacle without lifting table)

8 Drilling diagram for wall mounting plate (wall unit)

- Use wall mounting plate as a drilling template.
- Further details regarding the choice of fastening means see section "1.4".

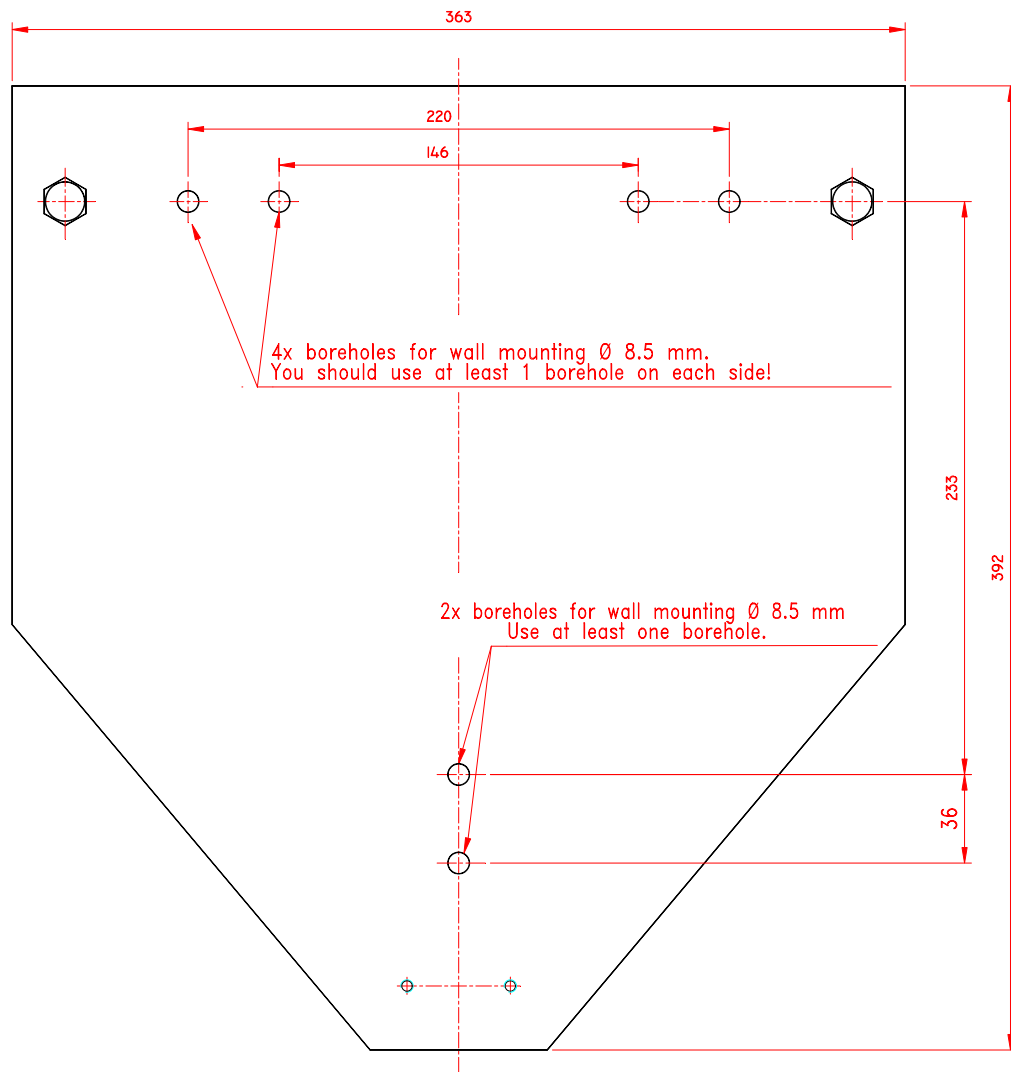


Fig. 9: drilling diagram for wall mounting plate (wall device)

9 Warranty conditions

This device conforms to the present safety regulations and was subjected to extensive testing before leaving the works.

We grant 12 months guarantee, in which we are obliged to carry out all repairs resulting from material or fabrication faults free of charge.

The warranty expires if repairs are not carried out by specialized dealers or by us.

Replacement for reasons covered by the guaranty does not lead to an extension of the original guaranty period.

Normal wear and tear or damages resulting from incorrect operation are not covered by the terms of warranty.

In order to be able to provide you with a comprehensive service we ask you to fill out the guarantee return form (attached at the beginning of these instructions) and send it to us by fax or letter (window envelope).

Fax no.: 0 71 81/ 73 13 9

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Copy
Guarantee return form

**Maschinenbau
Harnisch+Rieth GmbH & Co.
Postfach 1260
D-73644 Winterbach**

Machine
designation: Vacuum mixer

Machine type: D-VM 16

Machine no.:

Date of purchase:

Dealer/Store:

From:

Date/signature:

10 EC declaration of conformity

as stipulated by the EC directive for machines 89/392/EEC, Appendix II A

We herewith declare that due to its design the machine specified below is in conformity with the basic safety and health requirements of the EC directives.

In the event of modifications of the machine not approved by us this certificate loses its validity.

Name of the manufacturer : Harnisch+Rieth
Address of the manufacturer : Küferstraße 14-16, 73650 Winterbach
Machine designation : Vacuum mixer
Machine type : D-VM 16

The following pertinent EC directives were applied:

EC machine directive (89/392/EEC), corresponding to 9. GSG regulation of 12.05.93

EC low voltage directive (73/23/EEC), corresponding to 1. GSG regulation of 11.06.79

EC EMC directive (89/336/EEC), corresponding to EMC law of 09.11.92

Following harmonizing standards were applied:

DIN EN 292 : Safety of machines.
DIN EN 61 010-1 : Safety regulations for electrical measuring, controlling and laboratory devices.
DIN EN 55 014 : Interference suppression of electrical apparatus and installations.
DIN EN 55 104 : Electromagnetic compatibility, noise resistance requirements (category I).

A technical documentation is available.

The operation instructions belonging to the machine are also available.

Director of the Quality Control Department

Winterbach, 06th September, 1995